WHAT IS CLAIMED IS:

1. A method for diagnosing faults in a communications channel using a state machine controlled communications transceiver containing adaptive filters operably coupled to the communications channel, comprising:

generating a plurality of expected state machine sequences;

recording a state machine sequence from the state machine during operation of the transceiver;

normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that best approximates the state machine sequence;

reading a plurality filter coefficients from the transceiver adaptive filters;

calculating the quality of the communications channel using the plurality of filter coefficients; and

diagnosing faults in the communications channel based on the selected expected state machine sequence and the plurality of filter coefficients.

2. The method of Claim 1, wherein calculating the quality of the communications channel further includes:

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer function by dividing the communications channel frequency response by a Fourier transform of a transmitted pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

3. The method of Claim 2, further including estimating the length of the communications channel by dividing the value of the transfer function at a specified frequency by an expected loss per unit length of the communication channel at the specified frequency.

4. A method for determining the quality of a communications channel operably coupled to a communications transceiver containing adaptive filters, comprising:

reading a plurality of filter coefficients from the adaptive filters;

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer function by dividing the communications channel frequency response by a Fourier transform of a transmitted pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

5. A method for diagnosing an adaptive system operably coupled to external systems wherein the adaptive system is controlled by a state machine, comprising:

generating a plurality of expected state machine sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that matches the state machine sequence; and

determining the status of the adaptive system based on the selected expected state machine sequence.

6. The method of Claim 5, wherein the plurality of expected state machine sequences are normalized based on a sample frequency of the state machine sequence.

7. The method of Claim 6, wherein an approximate string matching algorithm is used to match the selected expected state machine sequence and the state machine sequence.

8. The method of Claim 7, wherein determining the status of the adaptive system further includes:

obtaining adaptive data from the adaptive system; and

determining the status of the external systems using the adaptive data.

9. A method for diagnosing a real-time system controlled by a state machine, comprising:

generating a plurality of expected state machine sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that matches the state machine sequence; and

determining the status of the real-time system based on the selected expected state machine sequence.

10. The method of Claim 9, wherein the plurality of expected state machine sequences are normalized based on a sample frequency of the state machine sequence.

11. The method of Claim 10, wherein the state machine sequence is recorded by the state machine.

12. The method of Claim 11, wherein an approximate string matching algorithm is used to match the selected expected state machine sequence and the state machine sequence.

13. A data processing system adapted to diagnose faults in a communications channel using a state machine controlled communications transceiver containing adaptive filters operably coupled to the communications channel, comprising:

a processor; and

a memory operably coupled to the processor and having program instructions stored therein, the processor being operable to execute the program instructions, the program instructions including:

reading a plurality of expected state machine sequences;

recording a state machine sequence from the state machine during operation of the transceiver;

normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that best approximates the state machine sequence;

reading a plurality of filter coefficients from the transceiver adaptive filters;

calculating the quality of the communications channel using the plurality of filter coefficients; and

diagnosing faults in the communications channel based on the selected expected state machine sequence and the plurality of filter coefficients.

14. The data processing system of Claim 13, the program instructions further including:

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer function by dividing the communications channel frequency response by a Fourier transform of a transmitted

pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

15. The data processing system of Claim 14, the program instructions further including estimating the length of the communications channel by dividing the value of the transfer function at a specified frequency by an expected loss per unit length of the communication channel at the specified frequency.

16. A data processing system adapted to determine the quality of a communications channel operably coupled to a communications transceiver containing adaptive filters, comprising:

a processor; and

a memory operably coupled to the processor and having program instructions stored therein, the processor being operable to execute the program instructions, the program instructions including:

reading a plurality of filter coefficients from the adaptive filters;

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer

function by dividing the communications channel frequency response by a Fourier transform of a transmitted pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

17. A data processing system adapted to diagnose an adaptive system operably coupled to external systems wherein the adaptive system is controlled by a state machine, comprising:

a processor; and

a memory operably coupled to the processor and having program instructions stored therein, the processor being operable to execute the program instructions, the program instructions including:

reading a plurality of expected state machine sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that matches the state machine sequence; and

determining the status of the adaptive system based on the selected expected state machine sequence.

18. The data processing system of Claim 17, the program instructions further including normalizing the plurality of expected state machine sequences based on a sample frequency

of the state machine sequence.

19. The data processing system of Claim 18, the program instructions further including matching a selected expected state machine sequence to the state machine sequence using an approximate string matching algorithm.

20. The data processing system of Claim 19, the program instructions for determining the status of the adaptive system further including:

obtaining adaptive data from the adaptive system; and

determining the status of the external systems using the adaptive data.

21. A data processing system adapted to diagnose a real-time system controlled by a state machine, comprising:

a processor; and

a memory operably coupled to the processor and having program instructions stored therein, the processor being operable to execute the program instructions, the program instructions including:

reading a plurality of expected state machine sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that matches the state machine sequence; and

determining the status of the real-time system

based on the selected expected state machine sequence.

22. The data processing system of Claim 21, the program instructions further including normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence.

23. The data processing system of Claim 22, the program instructions further including matching a selected expected state machine sequence to the state machine sequence using an approximate string matching algorithm.

24. The data processing system of Claim 23, wherein the state machine sequence is recorded by the state machine.

25. A computer-readable storage medium embodying computer program instructions for execution by a computer, the computer program instructions adapting a computer to diagnose faults in a communications channel using a state machine controlled communications transceiver containing adaptive filters operably coupled to the communications channel, the computer program instructions comprising:

generating a plurality of expected state machine sequences;

recording a state machine sequence from the state machine during operation of the transceiver;

normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence;

selecting from the plurality of expected state machine

sequences a selected expected state machine sequence that best approximates the state machine sequence;

reading a plurality filter coefficients from the transceiver adaptive filters;

calculating the quality of the communications channel using the plurality of filter coefficients; and

diagnosing faults in the communications channel based on the selected expected state machine sequence and the plurality of filter coefficients.

26. The computer-readable storage medium of Claim 25, the computer program instructions further comprising:

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer function by dividing the communications channel frequency response by a Fourier transform of a transmitted pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

27. The computer-readable storage medium of Claim 26, the computer program instructions further comprising estimating the length of the communications channel by dividing the value of the transfer function at a specified frequency by an expected loss per unit length of the communication channel at the specified frequency.

28. A computer-readable storage medium embodying computer program instructions for execution by a computer, the computer program instructions adapting a computer to determine the quality of a communications channel operably coupled to a communications transceiver containing adaptive filters, the computer program instructions comprising:

reading a plurality of filter coefficients from the adaptive filters;

calculating a communications channel pulse response using the plurality of filter coefficients;

calculating a communications channel frequency response using the communications channel pulse response and applying an inverse Fourier transform;

calculating a communications channel transfer function by dividing the communications channel frequency response by a Fourier transform of a transmitted pulse; and

comparing the communications channel transfer function to a standard communications channel transfer function.

29. A computer-readable storage medium embodying computer program instructions for execution by a computer, the computer program instructions adapting a computer to diagnose an adaptive system operably coupled to external systems wherein the adaptive system is controlled by a state machine, the computer program instructions comprising:

reading a plurality of expected state machine sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence matching the state machine sequence; and

determining the status of the adaptive system based on the selected expected state machine sequence.

30. The computer-readable storage medium of Claim 29, the computer program instructions further comprising normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence.

31. The computer-readable storage medium of Claim 30, the computer program instructions further comprising matching a selected expected state machine sequence to the state machine sequence using an approximate string matching algorithm.

32. The computer-readable storage medium of Claim 31, the computer program instructions for determining the status of the adaptive system further including:

obtaining adaptive data from the adaptive system; and

determining the status of the external systems using the adaptive data.

33. A computer-readable storage medium embodying computer program instructions for execution by a computer, the computer program instructions adapting a computer to diagnose a real-time system controlled by a state machine, the computer program instructions comprising:

reading a plurality of expected state machine

sequences;

recording a state machine sequence from the state machine;

selecting from the plurality of expected state machine sequences a selected expected state machine sequence that matches the state machine sequence; and

determining the status of the real-time system based on the selected expected state machine sequence.

34. The computer-readable storage medium of Claim 33, the computer program instructions further comprising normalizing the plurality of expected state machine sequences based on a sample frequency of the state machine sequence.

35. The computer-readable storage medium of Claim 34, the computer program instructions further comprising matching a selected expected state machine sequence to the state machine sequence using an approximate string matching algorithm.